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AN ECOLOGICAL STUDY OF THE SPIDERS OF THE BEECH-MAPLE FOREST.*

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INTRODUCTION.

The members of the order Araneæ have been studied extensively in several sections of North America by a number of students of the group including Walckenaer, McCook, Emerton, R. V. Chamberlin, Banks, Petrunkevitch, Peckham, Barrows, Crosby, Bishop and others with the result that now new species of spiders are of little more frequent report than new species of insects in many of the orders.

Works of a non-taxonomic nature dealing with seasonal succession and abundance, migration, hibernation, quantitative relations etc. have had to do with the entire population or a rather large group (Adams 1915), (Holmquist 1926) in an association such as Prairie (Adams 1915), Coniferous forest (Sanderson and Shelford 1922), (Adams 1920), (Blake 1926) or Deciduous forest (Shelford 1912, 13) (Adams 1915) (Weese 1924), (Blake 1926).

The study here considered is that of the Beech-Maple forest and is limited to an intensive consideration of the Spiders. These are here discussed from two view points; Taxonomic, having to do with the species present in the beech-maple forest and Ecological, involving a discussion of the species present as to specificity for the habitat, hibernation, migration, annual and seasonal cycle, and various other ecological aspects.

An eighty acre Beech-Maple forest, known as Lewis Woods, located in extreme eastern Indiana, near Richmond, was selected as a restricted area for intensive observation and collection. This area is a rectangular tract 80 by 160 rods, heavily wooded with beech and sugar maple on the upland

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portion with admixture of some ash, and an occasional buckeye and linden on lower levels. This forest had not been pastured for thirty-five years and then only occasionally nor had any timber been removed from it during that time except the removal of a few beech trees over an area of about three acres near each end, about three years ago. This forest is the Beech-Sugar mesophytic forest typical of well drained physiographically mature soils (Sears 1926) and doubtless a typical primary association, and being unmodified by activity of man well represents a close approximation to primitive forest conditions. Its spider population is doubtless similarly typically representative.

Collecting was by beating branches and small trees, sweeping herbs and bushes, sifting leaves, humus and upper soil layer and the removal of bark and wood of dead trees, logs, woodpiles and stumps.

Collections and observations were made in other Beech-Maple forests in Indiana and Ohio with results which coincided with those obtained in the selected environment.

The account of the Spiders is given as follows: (a) The beech-maple forest as a habitat and the interrelation of the physical and biotic factors (b) species, genera, and families of spiders present (c) the distribution of the spiders in the beech-maple association (d) the annual and seasonal succession (e) migration and hibernation (f) the specificity of the species present for the association and (g) the representation of each species and the relation of the principal species to the total spider population.

I am very much indebted to Dr. W. M. Barrows of the Department of Zoology of Ohio State University for valuable suggestions, assistance in the determination of the species and the loan of literature.

The Beech-Maple Forest as a Habitat.

The beech-maple forest like that of the deciduous forest in general presents a well stratified habitat with more uniform conditions for any period of the year than those in other associations such as the low arctic tundra, prairie, heath, etc. This is in part due to the absence of alpine conditions and in large measure to the influence of the forest cover itself. The marked physical feature is the constancy and sharpness of the strata, this being correlated with and primarily caused by

stratification of plant societies. The principal strata are Forest floor, Herb, Shrub and Bush and the Forest cover.

The forest floor is a level of low but constant temperature, high moisture, minimum evaporation, scant light, rather constant population except in winter when increased by migrants. The predominant animals are those suited to considerable moisture, fairly low summer temperature and minimum light.

From the forest floor to the herb stratum occurs the steepest gradient in the series for the physical factors. Animals going from the ground floor to the herb stratum undergo pronounced changes in the physical environment. The population of this stratum is larger and more varied than that of any other stratum.

Shrub and Bush and Forest cover present differences of the same character as those between forest floor and herb strata but of much less magnitude and of less decisive character.

Examination of the population of the forest shows that it exhibits rather definite divisions into stratal societies. A further study (Weese) brings out an existing correlation between the physical and biotic differences of the successive strata. These two forces are of different importance at different periods of the annual cycle, the physical factors becoming markedly of greater importance at seasonal periods. This is very clearly evidenced in the beech-maple forest in the case of spiders by changing distribution in the autumn and spring.

During spring, summer and fall the animal population of the forest falls into stratal societies which are in general in agreement with the stratification of physical factors and vegetation. This would seem to be of direct value to the plant eating forms, but since even they respond to the physical factors by stratum to stratum migration, and as stratification occurs also among such animals as spiders which possess no relations with the vegetation it would seem that the physical factors are important and decisive (Blake 1926). A considerable number of species of spiders habitually pass between herb and shrub strata while a much smaller number divide their activity between ground and herb strata. The tendency seems to be for animals to make traverse only between strata which are separated by moderate gradients.

Weese (1924) gives evidence that the lower temperature fluctuations of fall serves as a stimulus causing beetles to migrate first into the interior of the forest then downward into the lower strata for hibernation. The downward migra-

tion of both young and adults of many herb and shrub inhabitating spiders is a distinctive characteristic of the group, more than half of the species here found doing so, and is in all probability a definite response primarily to changing temperatures. Vertical shifting, community stratification and other distribution of spiders though of less extreme character are in all probability largely gradational responses to changing biotic and physical conditions.

The Spiders Occurring in Beech-Maple Forest.

The name given to each spider is that listed in the Synonymic Index-Catalogue of Spiders of North, Central and South America (Petrunkevitch). The Synonomy is also largely based on the same. No attempt is made to give a complete synonomy but merely to list the principal other names by which a spider has been described by leading Arachnologists, principally Blackwall, Chamberlin, Emerton, Hentz, Keyserling, McCook, Peckham, Simon, and Walckenaer, to the end that it may best serve the needs of those having recourse to any of these works. In most cases the name listed is that by which the individual is best known. In some instances, however, a spider is best known by some synonym and will be most frequently described by American students under such. Confusion resulting from the nomenclature given however is compensated by advantages accruing from adherence to the rule of priority. The arrangement of the families and genera is that given in Systema Aranearum, by the same author. The species are for convenience numbered from one to ninety-nine.

Family **Dysderidæ.**

1. *Ariadne bicolor* Hentz. Same Emerton-Simon; *Pylarus bicolor* and *pumulis* Hentz.

Family **Amaurobidæ.**

2. *Amaurobius americana* Emerton. *Titanoeca americana* Emerton-Banks; *Titanoeca brunnea* Emerton.
3. *Amaurobius bennetti* Blackwall. Same Banks; *Ciniflo benneti* Blackwall; *A. sylvestris* Emerton-Simon.

Family **Agelenidæ.**

4. *Agelena naevia* Walckenaer. Same Hentz-Emerton; *Agelena peninsulana* C. Koch; *Agelena potteri* Blackwall; *Agelena americana* Keyserling.
5. *Cicurina arcuta* Keyserling. Same Simon; *Cicurina complicata* Emerton.
6. *Cicurina brevis* Emerton. Same Banks; *Tegenaria brevis* Emerton; *Cicurina creber* Banks.
7. *Cicurina pallida* Keyserling. Same Emerton.
8. *Coelotes hybridus* Emerton.

9. *Coelotes longitarsus* Emerton. *Coelotes gnavus* Banks.
10. *Coelotes montanus* Emerton.
11. *Coras medicinalis* Hentz. Same Emerton-Simon. *Teneraria medicinalis* Hentz; *Coelotes medicinalis* Emerton; *Coelotes urbanus* Keyserling.
12. *Hahnia agilis* Kerserling. *Hahnia bimaculata* Emerton.
13. *Hahnia cinerea* Emerton.
14. *Hahnia radula* Emerton. Same Simon.

Family **Pisaurinidæ.**

15. *Pisaurina mira* Walckenaer. Same Montgomery; *Dolomedes mirus* and *virgatus* Walckanaer; *Micrommata undata, serrata, caroliensis* and *marmorata* Hentz; *Pisaurina undata* Banks; *Ocyale undata* Emerton-Montgomery; *Dolomedes binotatur* C. Koch.
16. *Dolomedes fontanus* Emerton. Same Montgomery; *Dolomedes tenebrosus* Emerton-Hentz.

Family **Lycosidæ.**

17. *Allocosa funerea* Hentz. Same Chamberlin; *Lycosa funerea* Hentz; *Lycosa* and *Trochosa sublata* Montgomery.
18. *Lycosa gulosa* Walckenaer. Same Chamberlin; *Lycosa kochii* Emerton; *Lycosa purcelli, nigraurata, euepigyrata* and *insopita* Montgomery; *Trochosa purcelli* Montgomery; *Tarentula pulchra* Keyserling; *Lycosa pulchra* Chamberlin.
19. *Lycosa rabida* Walckenaer. Same Banks; *Lycosa scutulata* Hentz-Emerton-Montgomery-Chamberlin.
20. *Schizocosa crassipes* Walckenaer. Same Petrunkevitch; *Lycosa crassipes* Walckenaer; *Lycosa ocreata* Hentz-Keyserling-Emerton-Chamberlin; *Lycosa rufa* Kerserling; *Lycosa stonei* Montgomery; *Pardosa solivaga* Montgomery.
21. *Pirata febriculosa* Becker. *Lycosa febriculosa* Becker-Chamberlin; *Lycosa wacondana* Scheffer; *Pirata sedentarius* Montgomery.

Family **Dictynidæ.**

22. *Dictyna foliacea* Hentz. Same Banks; *Theridium foliaceum* Hentz; *Theridium roscidum* Hentz; *Theridion hypophyllum* Fitch; *Dictyna volupis* Keyserling-Emerton; *Dictyna dubia* Banks.
23. *Dictyna minuta* Emerton.
24. *Dictyna sublata* Hentz. Same Banks; *Theridion sublatum* and *morologum* Hentz; *Dictyna sedentaria* and *foliata* Keyserling; *Dictyna muraria* Emerton.
25. *Lathys foxii* Marx. Same Banks-Simon; *Prodalia foxii* Marx.
26. *Lathys pallida* Emerton. Trans. Conn. Acad. Sci., Vol. IX, 1894, new.

Family **Theridiidæ.**

27. *Pedanostethus pumulus* Emerton. Supplement New Eng. Spiders, Jan., 1909, Vol. 14, p. 183. Described as new.
28. *Crustulina guttata* Wider. Same Simon; *Theridion guttata* Wider; *Steatoda guttata* Emerton; *Crustulina sticta* Keyserling.
29. *Steatoda borealis* Emerton. Same Keyserling; *Theridion borealis* Hentz.
30. *Euryopis funebris* Hentz. Same Emerton-Keyserling-Simon-Banks; *Theridion funebre* Hentz.
31. *Theridion differens* Emerton. Same Keyserling.
32. *Theridion frondeum* Hentz. Same Emerton-Keyserling-Simon-Cambridge.
33. *Theridion pennsylvanicum* Emerton. Bulletin Am. Mus. Nat. Hist., Vol. XXXII, New and Rare Spiders Fifty Miles of New York.
34. *Theridula opulenta* Walckenaer. Same Simon-Cambridge-Hentz; *Theridula sphaerula* Emerton-Keyserling; *Theridion sphaerulum* Hentz; *Theridion gonygaster* Simon; *Theridula triangularis, quinqueguttata* and *quadripunctata* Keyserling; *Theridion ventillaris* Keyserling.

Family **Linyphiidæ.**

35. *Bathyphantes micraria* Emerton. Same Banks.
36. *Bathyphantes nigrinus* Westring. Same Simon; *Linyphia nigrina* Westring-Emerton; *Linyphia pulla* Blackwall; *Diplostyla nigrina* Emerton.

37. *Bathyphantes zebra* Emerton. Same Banks.
38. *Linyphia clathrata* Sundevall. Same Emerton-Simon; *Linyphis multiguttata* Ruess; *Linyphia luctuosa* C. Koch; *Nereine marginata* Blackwall; *Frontina clathrata* Keyserling.
39. *Linyphia conferta* Hentz. nec *L. conferta* Banks; nec *Floronia conferta* Banks.
40. *Linyphia marginata* Emerton. Same C. Koch-Simon-Keyserling; *Linyphia triangularis* Walckenaer-Blackwall; *Linyphia marmorata* Hentz.
41. *Linyphia phrygiana* C. Koch. Same Emerton-Simon-Keyserling; *Linyphia costata* Hentz.
42. *Microneta cornupalpis* Cambridge. Same Emerton-Banks-Simon; *Erigone cornupalpis* Cambridge.
43. *Ceraticelus minutus* Emerton. Same Crosby; *Ceratinella minuta* Banks-Emerton.
44. *Ceratinella brunnea* Emerton. Same Crosby; *Ceraticelus brunnea* Simon.
45. *Gongylidiellum pallidum* Emerton. Same Crosby; *Tmeticus pallidus* Emerton; *Erigone pallescens* Marx.
46. *Oedothorax montiferus* Emerton. Same Crosby; *Lophocarenum montiferum* Emerton. *Nereine montifera* Simon.
47. *Oedothorax platyrhinus* Crosby. See Journal New York Ent. Soc., Vol. XXXV, June, 1927—C. R. Crosby and Sherman C. Bishop.
48. *Oedothorax probatus* Cambridge. Same Crosby; *Erigone probata* Cambridge-Keyserling; *Tmeticus probatus* Emerton.
49. *Prosopotheca minuta* Emerton. Same Crosby-Simon; *Cornicularia minuta* Emerton; *Erigone paullula* Marx.
50. *Tmeticus aestivalis* Emerton. Trans. Conn. Acad. Sci., Vol. 16, 1911. New Spiders New England. Described as new.
51. *Ceratinopsis interpres* Cambridge. Same Emerton-Crosby; *Erigone interpres* Cambridge-Keyserling; *Notionelli interpres* Banks.
52. *Diplocephalus exiguus* Banks. Same Crosby; *Lophocarenum exiguum* Banks.
53. *Trachelocamptus rostratus* Emerton. Same Simon-Crosby. *Lophocarenum rostatum* Emerton.

Family **Uloboridæ.**

54. *Uloborus americana* Walckenaer. Same Cambridge; *Uloborus plumipis* Lucas-Emerton-Simon-McCook; *Uloborus villosus* Keyserling; *Phillyra manneata* and *riparia* Hentz.
55. *Hyptiotes cavatus* Hentz. Same Emerton-Simon-McCook; *Cyllopodia* Hentz; *Hyptiotes americanus* Wilder.

Family **Argyropidæ.**

56. *Acacesia foliata* Hentz. Same Simon-F. Cambridge; *Epeira foliata* Emerton-Hentz-McCook; *Epeira folifera* Marx.
57. *Araneus angulatus* Clerck. *Araneus virgatus* Clerck; *Epeira angulata* C. Koch-Simon-Emerton-McCook-Keyserling; *Epeira bicentenaria* McCook.
58. *Araneus arabesca* Wlackenaer. *Epeira arabesca* Walckenaer-McCook. *Epeira mutabilis* Walckenaer; *Epeira trivittata* Keyserling-Emerton; *Neoscona arabesca* F. Cambridge.
59. *Araneus arenatus* Walckenaer. *Epeira verrucosa* Hentz-Emerton. *Verrucosa arenata* McCook-F. Cambridge; *Mahadeva verrucosa* and *reticulata* Keyserling.
60. *Areneus ectypus* Walckenaer. *Epeira infumata* Hentz-Emerton. *Wixia ectypa* Keyserling-McCook; *Wicia infumata* Banks; *Epeira ectypa* Walckenaer-Keyserling.
61. *Araneus marmoreus* Clerck. *Araneus gigas conspicellata* Comstock; *Epeira insularis* Hentz-Keyserling-Emerton; *Epeira marmorea* C. Koch-Simon-Emerton-McCook; *Epeira scalaris* Walckenaer-Blackwall; *Epeira conspicellata* McCook-Walckenaer; *Epeira obesa* Hentz.
62. *Eustala anastera* Walckenaer. Same Simon-F. Cambridge; *Epeira bombicinaria* Hentz; *Epeira prompta* Hentz; *Epeira parvula* Emerton-Keyserling; *Epeira anastera* McCook.
63. *Mangora gibberosa* Hentz. *Epeira gibberosa* Hentz-Emerton-Keyserling; *Abbotia gibberosa* McCook; *Mangora gibberosa* Simon.

64. *Ordgarius bisaccatus* Emerton. Same Keyserling-McCook; *Glyptocranium bisaccatum* Emerton; *Epeira multilineata* Atkinson; *Cyrtarachne bisaccatum* Emerton.
65. *Leucauge venusta* Walckenaer. Same F. Cambridge; *Epeira venusta* Walckenaer; *Epeira hortorum* Hentz; *Argyroepeira hortorum* Emerton-Keyserling-McCook-Simon. *Tetragnatha quinquelineata* Keyserling; *Linyphia aurulenta* Walckenaer-C. Koch.
66. *Tetragnatha laboriosa* Hentz. Same Keyserling-Emerton-Banks-McCook; *Tetragnatha fluviatilis* Keyserling; *Tetragnatha illinoioensis* Keyserling.
67. *Micrathena gracilis* Walckenaer. Same, F. Cambridge-Simon; *Plectana gracilis* Walckenaer; *Acrosoma matronale* C. Koch; *Epeira rugosa* Hentz; *Acrosoma rugosa* Emerton; *Acrosoma gracilis* McCook; *Micrathena matronalis* McCook.
68. *Micrathena sagittata* Walckenaer. Same, Simon-F. Cambridge; *Plectana sagittata* Walckenaer; *Epeira spinea* Hentz; *Acrosoma bovinum* Thorell; *Acrosoma spinea* Emerton; *Acrosoma sagittata* McCook.

Family **Mimetidæ.**

69. *Ero furcatus* Villers. Same Simon-Keyserling; *Aranea furcata* Villers-Simon; *Ero variegata* C. Koch; *Theridion variegatum* Walckenaer-Blackwall; *Theridion leoninum* Hentz; *Ero thoracica* Thorell-Emerton.

Family **Drassidæ.**

70. *Herpyllus vasifer* Walckenaer. Same Simon; *Drassus vasifer* Walckenaer-Blackwall; *Herpyllus ecclesiasticus* Hentz; *Prosthesima propinqua* Keyserling; *Prosthesima ecclesiasticus* Emerton.
71. *Nodocion* sp.
72. *Sergiolus variegatus* Hentz. Same Emerton-Simon; *Herpyllus variegatus* Hentz; *Poecilochroa variegata* Emerton.
73. *Zelotes ater* Hentz. *Herpyllus ater* Hentz; *Prosthesima melancholica* Thorell; *Prosthesima funesta* Keyserling; *P. atra* Emerton; *Melanophora atra* Simon.

Family **Thomisidæ.**

74. *Philodromus minutus* Banks. *Philodromus brevis* Emerton; *Philodromus minusculus* Banks.
75. *Misumenops asperatus* Hentz. Same Emerton-Banks; *Misumena rosea* Keyserling-Banks; *misumena foliata* Banks; *Misumena placida* Banks; *Thomisus asperatus* Hentz.
76. *Misumenops oblongus* Keyserling. *Misumena oblonga* Keyserling-Emerton; *Misumessus oblongus* Banks.
77. *Oxyptilus monroensis* Keyserling. Same Banks.
78. *Tmarus* sp.? Probably *angulatus* Walckenaer; *Tmarus caudatus* Emerton-Keyserling; *Tmarus rubromaculatus* Keyserling; *Thomisus caudatus* Hentz.
79. *Xysticus ferox* Hentz. Same Banks; *Xysticus stomachosus* Keyserling-Emerton; *Thomisus ferox* Hentz.
80. *Xysticus fraternis* Banks. (Spiders of Long Island).
81. *Xysticus nervosus* Banks. Same Emerton.

Family **Clubionidæ.**

82. *Clubiona obesa* Hentz. Same Banks. *Clubiona crassipalpis* Keyserling-Banks-Emerton; *Clubiona mixta* Emerton.
83. *Clubiona pallens* Hentz. *Clubiona excepta* L. Koch-Emerton.
84. *Anyphaena pectorosa* L. Koch. *Anyphaena calcarata* Simon-Emerton; *Gayenna calcarata* Banks.
85. *Anyphaena saltabunda* Hentz. Same Emerton-Simon; *Clubiona saltabunda* Hentz.
86. *Phrurolithus alarius* Hentz. *Phrurolithus borealis* Emerton, Trans. Conn. Acad. Sci. 'II; *Herpyllus alarius* Hentz; *Phrurolithus palustris* Banks, in Spiders Cayuga Lake Basin, '92.

87. *Phrurolithus palustris* Banks. *Phrurolithus borealis* Emerton. See Notes on the Spiders of Southeastern United States by S. C. Bishop and C. R. Crosby, Journal Elisha Mitchell Scientific Society, Vol. 41, Nos. 3 and 4, April, 1926.
88. *Phrurolithus similis* Banks. Spiders Long Island.
89. *Trachelas tranquillus* Hentz; *Trachelas ruber* Keyserling-Emerton-Simon; *Clubiona tranquilla* Hentz-Banks; *Agelena plumbea* Hentz.
90. *Castaneria cingulata* C. Koch. *Castaneria bivittata* Keyserling; *Goetrecha bivittata* Emerton; *Thargalia bivittata* Banks; *Herpyllus zonarius* Hentz; *Spargassus cingulatus* Walckenaer; *Corinna cingulata* C. Koch.
91. *Castaneria longipalpus* Hentz. Same Banks; *Castaneria pinnata* Bryant; *Herpyllus longipalpus* Hentz; *Thargalia longipalpus, perplexa* and *pinnata* Banks; *Geotrecha pinnata* Emerton.

Family **Attidæ.**

92. *Synemosyna formica* Hentz. Same Emerton-Simon-Peckham; *Janus gibberosa* C. Koch.
93. *Maevia vittata.* Same Emerton-Simon-Peckham; *Attus vittatus* Hentz; *Attus niger* Hentz; *Plexippus undatus* C. Koch; *Maevia annulipes* C. Koch; *Astia vittata* Peckham.
94. *Habrocestum pulex* Hentz. Same Simon-Peckham; *Saitis pulex* Emerton-Peckham; *Saitis x-notata* Keyserling; *Cyrba pulex* Keyserling; *Attus pulex* Hentz; *Euophrys offuscata* C. Koch.
95. *Dendryphantes (Phidippus) audax* Hentz; *Attus audax* Hentz; *Attus tripunctatus* Hentz-Peckham; *Phidippus tripunctatus* Emerton; *Phidippus audax* Peckham; *Phidippus dubiosus* C. Koch.
96. *Dendryphantes capitatus* Hentz. Same Peckham; *Attus capitatus, hebes, parvus* and *octavus* Hentz; *Dendryphantes aestivalis* Emerton; *Dendryphantes insignis, ornatus* and *exiguus* Banks; *Dendryphantes octavus* Simon.
97. *Dendryphantes (Phidippus) clarus* Keyserling. *Phidippus insolens* Peckham; *Phidippus multiformis* Emerton-Peckham; *Phidippus minutus* and *princeps* Banks; *Phidippus clarus* Peckham.
98. *Icius hartii* Emerton. Same Banks-Peckham.
99. *Neon nelli* Peckham. Same Emerton-Simon; *Icius obliquus* Banks.

Distribution of the Spiders in the Association.

With the advent of spring and the first emergence of vegetation above the forest floor there is a marked increase in the activity of the spiders. As the season advances there is evidenced a pronounced different distribution of the species which becomes more and more marked. A number of the young and adults of species that have been present throughout the winter and newly hatched young of other species remain in the ground floor. Many of the species however definitely leave the forest floor not to reenter it again until the approach of winter.

The upward migration with most species extends but a few feet, the spiders being distributed on the low herbage, vines and shrubs. A few of the species however go well up into the trees. This is especially true of Araneus ectypa, Hyptiotes cavatus, Micrathena sagittata, Araneus arenatus, Philodromus minutus and Ordgarius bisaccatus. No attempt

was made to study carefully the forest cover to determine the number and kinds of spiders present in the same. Three groups only have been considered, Ground floor forms, Ground-Vegetation forms and Vegetation forms.

In Beech-Maple forest the separation of the vegetation into Herb stratum and Shrub stratum with reference to spiders cannot well be made as has been done in Elm-Maple (Weese) for the animal population in general. Almost without exception spiders thought to be of the herb stratum were found frequently in the shrub stratum. In addition all of the species listed as shrub forms for Elm-Maple (Weese) were in beech-maple found repeatedly in both shrub and herb stratum. In beech-maple forest differences in the physical factors, light, evaporation, humidity, temperature, etc. of the herb and shrub strata are apparently not great enough to bring about a stratification of the spider community.

The distribution of beech-maple spiders is here presented. The following forms were not listed in the groups, Allocosa funerea, a typical grassland form; Bathyphantes nigrinum, a typical grassland spider; Herpyllus vasifer, lives under bark; Ordgarius bisaccatus, a tree form; and Trachelas tranquillas, more typically a transitional or field form. The remaining species are as follows.

I. Ground Stratum Forms.

Forest floor spiders inhabiting leaves, humus and upper soil layer throughout the year.

Amaurobius americana
Amaurobius bennetti
Ariadne bicolor
Bathyphantes zebra
Castaneria cingulata
Castaneria longipalpis
Ceratinella brunnea
Ceraticelus minutus
Cicurina arcuata
Cicurina brevis
Cicurina pallida
Coelotes hybridus
Coelotes longitarsus
Coelotes montanus
Coras medicinalis
Crustulina guttata
Diplocephalus exiguus
Ero furcatus
Gongylidiellum pallidum
Hahnia agilis
Hahnia cinerea
Hahnia radula
Lathys foxii
Lathys sp. (*pallida?*)
Neon nellii
Nodocion sp.
Oedothorax platyrhinus
Oedothorax montiferus
Oedothorax probatus
Oxyptila monroensis
Pedanostethus pumulus
Phrurolithus alarius
Phrurolithus palustris
Phrurolithus similis
Prosopotheca minuta
Schizocosa crassipes
Tmeticus aestivalis
Trachelocamptus rostratus
Xysticus ferox
Xysticus fraternus
Zelotes ater

II. Ground-Herb-Shrub Forms.

Agelena naevia
Anyphaena saltabunda
Clubiona obesa
Clubiona pallens
Dendryphantes capitatus
Dendryphantes (Phid.) audax
Dendryphantes (Phid.) clarus
Dictyna foliacea
Dictyna minuta
Dictyna sublata
Dolomedes fontanus
Habrocestum pulex
Linyphia clathrata
Lycosa gulosa
Lycosa rabida
Maevia vittata
Microneta cornupalpis
Pisaurina mira
Pirata febriculosa
Sergiolus variegatus
Synemosyna formica
Xysticus nervosus

III. Herb-Shrub Forms.

Acacesia foliata
Araneus angulatus
Araneus arenatus
Araneus ectypus
Araneus marmoreus
Bathyphantes micraria
Bathyphantes nigrinum
Ceratinopsis interpres
Euryopis funebris
Eustala anastera
Hyptiotes cavatus
Icius hartii
Leucauge venusta
Linyphia marginata
Linyphia conferta
Linyphia phrygiana
Mangora gibberosa
Micrathena gracilis
Micrathena sagittata
Misumenops asperatus
Philodromus minutus
Steatoda borealis
Tetragnatha laboriosa
Theridion differens
Theridion frondeum
Theridion pennsylvanicum
Theridula opulenta
Tmarus sp. (*caudatus?*)
Uloborus americana

The Annual and Seasonal Succession.

The annual cycle of beech-maple spiders in their relation to the physical factors of the habitat, distribution in the forest and the dominants of the region is best understood in terms of its seasonal divisions, spring, summer, autumn and winter.

The Spring Period extends from about March 1 to June 1. The first portion is characterized by the absence of green vegetation and by rapidly rising temperature of both air and soil together with considerable rainfall. The forest as a habitat is still limited to the ground floor stratum. The spider community is practically restricted to this except such forms as on warmer days move about on the leaves and dead vegetation near the ground. The principal spiders present are Amaurobius bennetti, Gongylidiellum pallidum, Oedothorax probatus, Coelotes longitarsus, Phrurolithus palustris and Tmeticus aestivalis. The last three are the dominant species. It is interesting to note that all of the principal species are typical ground floor inhabitants.

The second portion is characterized by a well developed plant society of herb strata, advanced leaf condition of the

shrubs and appearance of green on the trees. Temperatures are much higher, rainfall less and insect life is abundant. The habitat now consists of two strata, ground floor and herb-shrub. The principal spiders of the ground floor are Amaurobius bennetti, Ariadne bicolor, Coelotes hybridus, Xysticus fraternus, Tmeticus aestivalis, Coelotes longitarsus, Phrurolithus palustris, Gongylidiellum pallidum and Hahnia agilis. The last four being the dominant forms. The principal species of Shrub-Herb Strata are Dendryphantes capitatus, Leucauge venusta, Ceratinopsis interpres and Theridion frondeum. The last two are the dominant forms.

The Summer Period extends from about June 1 to September 1. The first or aestival portion is characterized by rising temperature, increased evaporation and less light. The forest cover is well foliated and serves as shade. The dominant ground floor spiders are Agelena naevia, Phrurolithus alarius and Crustulina guttata. The principal species of the herb strata are Linyphia clathrata, Dendryphantes capitatus, Dictyna minuta, Leucauge venusta, Araneus marmoreus, Theridion frondeum and Micrathena sagittata. The last four are the dominant forms. Micrathena sagittata easily exceeds other forms being taken with almost every sweep of the net.

The later or serotinal period is characterized by a reversal of the aestival changes. The principal ground forms are Anyphaena saltabunda, Cicurina arcuata, Oedothorax probatus, Agelena naevia and Gongylidiellum pallidum. The last two are easily the dominant forms. Species of the Herb-Shrub stratum are Araneus marmoreus, Pisaurina mira, Leucauge venusta, Araneus arenatus and Mangora gibberosa. The last three are dominant forms, Mangora gibberosa far exceeding any other form. Numerous webs of Araneus arenatus with adult females are present. Micrathena sagittata so abundant in the late aestival is now limited to a small number of adults.

The Autmnal or Fall Period begins about September 1. This is characterized by a decline in temperature and some increase in light through reduction of shade from the forest cover. The forest floor is rapidly being covered anew with dead leaves which lie loosely upon the ground and are changing position frequently. This is rich in spiders from the herb and shrub strata as well as those that have migrated from the forest border. The herb-shrub stratum is still present but is rapidly

giving way to changing physical factors and assuming less importance. The principal species of the ground floor are Xysticus fraternus, Phrurolithus palustris, Amaurobius bennetti, Gongylidiellum pallidum, Oedothorax probatus and Anyphaena saltabunda. The last two are easily the dominant forms. The principal species of the early part of Autumn are Mangora gibberosa, Theridion frondeum, Dendryphantes capitatus, Pisaurina mira and Dictyna foliacea. The last two are dominants.

The Winter Period is characterized by the reduction of the habitat to a single stratum. Low temperature, increased light and more pronounced wind effects are present, a condition closely paralleling that of the tundra is now present. The principal ground floor forms are Anyphaena saltabunda, Linyphia clathrata, Phrurolithus palustris, Coras medicinalis, Amaurobius bennetti, and Xysticus fraternus. The last three are dominants. Physical factors now almost completely dominate biotic except for brief periods of rising temperature.

The Spider population of the beech-maple forest shows two distinct high peaks, one in late spring about May 1 and another in late summer about August 1. The late summer peak is not caused to an appreciable extent by the appearance of new species but is the result of the two distinct phases of spider life. In August the young from the spring adults have begun to appear and are at the peak within a few days. July is the worst month for collecting. Many of the adults of spring have disappeared, especially the males.

The dominant species of the Seasons follow:

Ground Floor Stratum	Herb-Shrub Stratum
SPRING.	
Prevernal period:	
Hahnia agilis	None
Gongylidiellum pallidum	
Phrurolithus palustris	
Coelotes longitarsus	
Vernal period:	
Hahnia agilis	*Ceratinopsis interpres*
Gongylidiellum pallidum	*Theridion frondeum*
Phrurolithis palustris	
Coelotes longitarsus	
SUMMER.	
Aestival period:	
Agelena naevia	*Micrathena sagittata*
Phrurolithus alarius	*Theridion frondeum*
Crustulina guttata	*Araneus marmoreus*
	Lecauge venusta

Serotinal period:		
Agelena naevia		*Mangora gibberosa*
Gongylidiellum pallidum		*Araenus arenatus*
		Leucauge venusta
	AUTUMN.	
Anyphaena saltabunda		*Dictyna foliacea*
Oedothorax probatus		*Pisaurina mira*
	WINTER.	
Amaurobius bennetti		None
Phrurolithus alarius		
Xysticus fraternus		

Migration and Hibernation.

A few spiders hibernate in special situations, as, Herpyllus vasifer, under bark; Amaurobius bennetti, in logs and stumps; Dolomedes fontanus, in piles of wood and under bark of logs.

Most of the spiders, however, winter over in the leaves, humus and soil strata. The general migration begins about the middle of September and progresses according to temperature, frost conditions and duration of the herbage near the forest floor. By the middle of October the weeds and herbage are for the most part dead and few spiders are found on the same except near the ground.

Certain of the spiders migrate at once into the deeper strata and are not seen again until the emergence in the spring. Other species remain in the forest floor a considerable time and migrate downward just before freezing. Very warm periods call up from the deeper hibernation these forms not found during winter weather. Upon the resumption of cold they disappear returning to the region lower in the ground, probably below the frost line. Still other species remain comparatively near the surface in the top soil or leaf stratum. Among these are many young and adults that live throughout the winter as such, together with adults of species that die in the late fall; the egg sac containing the winter stage, either eggs or young as the case may be. These seem to consist of species that are able to tolerate freezing with very little harm.

The results of the experimental study of the physical factors and distribution of the total animal population in Elm-Maple forest (Weese 1924) shows little correlation between this winter distribution and the atmospheric humidity. Changes in the population of hibernating animals are more probably influenced by the changing temperature than by any other physical factor. Population apices apparently coincide with

temperature changes. These described temperature relations exist with reference to the distribution of spiders. Apparently however the upward and downward migration, though unrelated to atmospheric humidity is to a considerable extent dependent in addition to temperature upon the amount of water present in the forest floor. In both cold and warm dry weather many spiders are well down in the upper soil level. Following heavy rains these migrate upward into the less moist leaf layer. This migration is repeated several times during the winter occurring with each melting of the snow. During March and April this vertical shifting is quite in evidence during alternate freezing and thawing and wet and dry periods.

In the hibernation period biotic influences are at their lowest. Many of the spiders are in a quiescent or dormant condition except during the rising temperature periods referred to. In these periods there is little evidence of predatory activity on the part of spiders.

It has not been possible to determine with certainty the hibernation stage for all the species. Time has not permitted the collection of egg sacs and examination of these for young or the keeping of them until hatching for the determination of the species. The hibernation stage of many of the species rests upon the collection of spiders made in December, January and February. The finding of a single individual does not necessarily determine the nature of the winter stage. Such an occurrence may be accidental. The presence of three or more individuals, especially if found on different occasions is taken to be the hibernation stage. The over-wintering stage of all the species is considered. The determination of 73 of these has been made. The species are grouped under three headings, spiders that hibernate in the immature or adult form, those that winter over in the egg sac either as young or eggs, and species with the hibernation stage undetermined.

SPIDERS THAT HIBERNATE IN IMMATURE OR ADULT FORM.

Amaurobinus bennetti
Anyphaena saltabunda
Araneus arabesca
Ariadne bicolor
Bathyphantes nigrinum
Bathyphantes zebra
Castaneria cingulata
Ceraticelus minutus
Ceratinopsis interpres
Cicurina brevis
Cicurina arcuata
Hahnia cinerea
Hahnia radula
Herpyllus vasifer
Hyptiotes cavatus
Lathys foxii
Lathys pallida
Linyphia clathrata
Linyphia phrygiana
Lycosa rabida
Maevia vittata
Microneta cornupalpis

Cicurina pallida
Clubiona obesa
Clubiona pallens
Coelotes hybridus
Coelotes longitarsus
Coelotes montanus
Coras medicinalis
Crustulina guttata
Dendryphantes capitatus
Dendryphantes (Phid.) audax
Dendryphantes (Phid.) clarus
Dictyna foliacea
Dictyna minuta
Dictyna sublata
Diplocephalus exiguus
Dolomedes fontanus
Ero furcatus
Euryopis funebris
Eustala anastera
Gongylidiellum pallidum
Habrocestum pulex
Hahnia agilis
Misumenops asperatus
Neon nellii
Nodocion sp.
Oedothorax probatus
Oedothorax montiferus
Oedothorax platyrhinus
Phrurolithus alarius
Phrurolithus palustris
Pisaurina mira
Schizocosa crassipes
Sergiolus variegatus
Steatoda borealis
Tetragnatha laboriosa
Theridion frondeum
Tmeticus aestivalis
Trachelas tranquillas
Trachelocamptus rostratus
Uloborus americana
Xysticus ferox
Xysticus fraternus
Zelotes ater

SPECIES THAT WINTER OVER IN THE EGG SAC AS EGGS OR VERY YOUNG.

Agelena naevia
Mangora gibberosa
Micrathena gracilis
Ordgarius bisaccatus
Amaurobius americana
Araneus arenatus
Leucauge venusta
Micrathena sagittata

HIBERNATION STAGE UNDETERMINED.

Allocosa funerea
Acacesia foliata
Araneus angulatus
Araneus ectypa
Araneus marmoreus
Anyphaena pectorosa
Bathyphantes micraria
Castaneria longipalpus
Ceratinella brunnea
Icius hartii
Linyphia conferta
Linyphia marginata
Lycosa gulosa
Misumenops gulosa
Oxyptila monroensis
Philodromus minutus
Pedanostethus pumulus
Phrurolithus similis
Pirata febriculosa
Prosopotheca minuta
Synemosyna formica
Theridion differens
Theridion pennsylvanicus
Theridula opulenta
Tmarus angulatus
Xysticus fraternus

SPECIFIC RELATION OF THE SPECIES TO THE ASSOCIATION.

The study of almost any vegetation association discloses the presence of numerous individuals of species that are not characteristic or typical of the association. In general the greater the diversity of conditions within the association and the smaller the area the larger will be the proportion of such forms present. Although the area under study was of considerable size and collections were made well within the forest and for the most part in rather densely populated portions the occurrence of such species of spiders was fairly common. This made necessary a careful study of all species present to determine

the forms typical of the habitat and those that belonged elsewhere. The spiders present have been placed in the following four groups, Forest spiders, Transitional, Field and Miscellaneous.

Under Forest spiders is included those species that are regularly found in beech-maple as evidenced by numerous collections in this and other forests. This does not imply that these species are not found in other types of forest. Incomplete collections I have made in Oak-Hickory forest yield 46 of the same species while Weese (1924) gives about 40 of the same as being present in Elm-Maple forest. If as Blake (1926) suggests the mere presence of the forest cover rather than the character of the same is the major factor in distribution we may expect to find a large proportion of the same spiders in other types of dedicuous forests and to considerable extent even in the coniferous forest.

In the Transition group are those spiders that are found regularly and in largest numbers in the forest border or in regions where the timber has been cut off resulting in a mixed grassland-forest association.

Field spiders are those species found regularly in open grassland, pastures, and other areas denuded of trees and shrubs.

Forms undetermined, on account of scarcity, those ranging about equally over all the other groups and those more typical of different deciduous forests are placed under the heading Miscellaneous.

The distribution makes no pretense at being wholly accurate but is that indicated by the study of the selected region, miscellaneous collections in the same vicinity, those in other beech-maple forests and numerous collections of Dr. W. M. Barrows.

In the case of a considerable number of species the grouping is correct. In some instances, however, the number of individuals collected is not sufficient to make certain of the correct habitat. This is especially true of such forms as Hahnia radula, Lathys sp. (pallida?), Phrurolithus similis, Dictyna sublata, Linyphia conferta and the forms in the miscellaneous group marked insufficient data.

This arrangement does not signify that a species is limited to a given association but it does mean that it is found habitually and in greatest numbers in the habitat indicated.

The comparative abundance of different species found in a habitat is no criterion for the placing of a species. A species typical for one habitat may exceed numerically in another a species typical for that habitat. This may quite well be seen in the case of Agelena naevia. This spider is far more abundant in fields than in woods and is typically a field spider. It exceeds numerically, however, many of the typical forest spiders. The same condition has been found to prevail for animals in general in the Elm-Maple forest (Weese). Animal sub-dominants during a considerable period of the year are species which have migrated from or are in course of migration to the forest edge or adjacent meadow.

The grouping though inaccurate in some instances is presented in the hope that it may stimulate intensive collection on the part of those ecologically minded with resultant verification or necessary corrections.

FOREST SPIDERS (Beech-Maple).

Araneus marmoreus
Ariadne bicolor
Amaurobius bennetti
Cicurina arcuata
Cicurina brevis
Cicurina pallida
Coelotes hybridus
Coelotes longitarsus
Coelotes montanus
Coras medicinalis
Hahnia radula
Dolomedes fontanus
Lathys foxii
Lathys sp. (*pallida?*)
Bathyphantes zebra
Linyphia clathrata
Microneta cornupalpis
Ceraticelus minutus
Clubiona obesa
Clubiona pallens
Anyphaena pectorosa
Anyphaena saltabunda
Phrurolithus alarius
Phrurolithus palustris
Phrurolithis similis
Gongylidiellum pallidum
Oedothorax probatus
Prosopotheca minuta
Tmeticus aestivalis
Ceratinopsis interpres
Trachelocamptus rostratus
Uloborus americana
Hyptiotes cavatus
Araneus angulatus
Araneus arenatus
Araneus ectypus
Leucauge venusta
Micrathena gracilis
Steatoda borealis
Nodocion sp.
Sergiolus variegatus
Zelotes ater
Philodromus minutus
Xysticus fraternus
Castaneria cingulata
Castaneria longipalpis
Habrocestum pulex
Neon nellii

TRANSITIONAL SPIDERS.

Pisaurina mira
Pirata febriculosa
Dictyna foliacea
Dictyna minuta
Dictyna sublata
Ordgarius bisaccatus
Micrathena sagittata
Misumenops asperatus
Misumenops oblongus
Dendryphantes capitatus
Icius hartii
Xysticus nervosus
Theridion differens
Theridula opulenta
Linyphia conferta
Linyphia marginata
Linyphia phrygiana
Acacesia foliata
Synemosyna formica
Maevia vittata
Dendryphantes (*Phid.*) *clarus*

FIELD SPIDERS.

Agelena naevia
Tetragnatha laboriosa
Crustulina guttata
Theridion frondeum
Trachelas tranquillus
Mangora gibberosa
Allocosa funerea
Xysticus ferox
Araneus arabesca
Bathyphantes nigrinus

MISCELLANEOUS.

Amaurobius americana, forest, but more typically Oak-Hickory.
Hahnia agilis, field and forest; probably also transitional.
Herpyllus vasifer, woods under bark, chiefly Oak-Hickory.
Lycosa rabida, insufficient data.
Pedanostethus pumulus, insufficient data.
Bathyphantes micraria, insufficient data.
Ceratinella brunnea, insufficient data.
Oedothorax montiferus, insufficient data.
Diplocephalus exiguus, insufficient data.
Ero furcatus, insufficient data.
Theridion pennsylvanicus, insufficient data.
Lycosa gulosa, insufficient data.
Oxyptila monroensis, insufficient data.
Eustala anastera, insufficient data.
Tmarus angulatus, insufficient data.
Oedothorax platyrhinus, insufficient data.
Schizocosa crassipes, all habitats.
Dendryphantes (Phid.) audax, all habitats.

COMPARATIVE ABUNDANCE OF THE SPECIES.

Observations and collections were carried on in the selected environment over a period of approximately sixteen months. Numerous collections were made of a general nature during this period. It was quite apparent from general observation that certain species were much more abundant than others. With a view to determining the relative abundance of the species quantitative collecting was done in the selected region. These collections were made from April 13, 1928 to April 10, 1929 approximately every two weeks except during the winter months when conditions were constant for a longer period. All individuals of such collections were saved, siftings being gone over carefully within a few hours after collection. Every effort was made to equalize the time and attention given to different situations and species in order that the true conditions might best be represented. One of the most difficult and time consuming features in connection with this was the identification of the young spiders. These were carefully sorted and kept, sometimes for several weeks until an adult was found and identified after which successive growth stages were carefully compared and the species determined.

Some of all the species found were present in the Special Collections. The species present and the total number of each were as follows:

INDIVIDUALS AND SPECIES PRESENT IN THE SPECIAL COLLECTIONS.

Ariadne bicolor	56	*Ceratinopsis interpres*	69
Amaurobius americana	16	*Diplocephalus exiguus*	26
Amaurobius bennetti	158	*Trachelocamptus rostratus*	14
Agelena naevia	106	*Uloborus americana*	18
Cicurina arcuata	143	*Hyptiotes cavatus*	8
Cicurina brevis	7	*Acacesia foliata*	6
Cicurina pallida	22	*Araneus angulatus*	4
Coelotes hybridus	53	*Araneus arabesca*	27
Coelotes longitarsus	146	*Araneus arenatus*	42
Coelotes montanus	6	*Araneus ectypus*	4
Coras medicinalis	32	*Araneus marmoreus*	71
Hahnia agilis	154	*Eustala anastera*	4
Hahnia cinerea	23	*Mangora gibberosa*	134
Hahnia radula	9	*Ordgarius bisaccatus*	1
Pisaurina mira	82	*Leucauge venusta*	109
Dolomedes fontanus	53	*Tetragnatha laboriosa*	5
Allocosa funera	6	*Micrathena gracilis*	11
Lycosa gulosa	4	*Micrathena sagittata*	154
Lycosa rabida	7	*Ero furcatus*	8
Schizocosa crassipes	18	*Herpyllus vasifer*	3
Pirata febriculosa	2	*Nodocion sp.*	9
Oxyptilus monroensis	3	*Sergiolus variegatus*	2
Dictyna foliacea	84	*Zelotes ater*	8
Dictyna minuta	16	*Philodromus minutus*	3
Dictyna sublata	16	*Misumenops asperatus*	56
Lathys foxii	18	*Misumenops oblongus*	5
Lathys sp. (pallida?)	4	*Tmarus sp. (angulatus?)*	4
Pedanostethus pumulus	3	*Xysticus ferox*	10
Crustulina guttata	18	*Xysticus fraternis*	184
Steatoda borealis	6	*Xysticus nervosus*	7
Euryopis funebris	7	*Clubiona obesa*	39
Theridion differens	2	*Clubiona pallens*	19
Theridion frondeum	264	*Anyphaena pectorosa*	16
Theridion pennsylvanicum	6	*Anyphaena saltabunda*	101
Theridula opulenta	3	*Phrurolithus alarius*	110
Bathyphantes micraria	2	*Phrurolithus palustris*	260
Bathyphantes nigrinus	4	*Phrurolithus similis*	7
Bathyphantes zebra	21	*Trachelas tranquillus*	4
Linyphia clathrata	50	*Castaneria cingulata*	16
Linyphia conferta	2	*Castaneria longipalpus*	2
Linyphia marginata	5	*Synemosyna formica*	1
Linyphia phrygiana	16	*Maevia vittata*	27
Microneta cornupalpis	11	*Habrocestum pulex*	25
Ceraticelus minutua	4	*Dendryphantes (Phid.) audax*	10
Ceratinalla brunnea	5	*Dendryphantes capitatus*	167
Gongylidiellum pallidum	244	*Dendryphantes (Phid.) clarus*	15
Oedothorax montiferus	3	*Icius hartii*	6
Oedothorax platyrhinus	4	*Neon nellii*	31
Oedothorax probatus	196		
Prosopotheca minuta	8	*Total*	4201
Tmeticus aestivalis	209		

Examination of the list as to representation of the species in the total population makes apparent the fact that a com-

paratively small number of species make up the greater proportion of individuals present. The principal species and their numerical relation to the total number of spiders present are here given.

SPECIES REPRESENTED BY 100 OR MORE INDIVIDUALS.

Amaurobius bennetti
Agelena naevia
Cicurina arcuata
Coelotes longitarsus
Hahnia agilis
Theridion frondeum
Congylidiellum pallidum
Oedothorax probatus
Tmeticus aestivalis
Mangora gibberosa
Leucauge venusta
Micrathena sagittata
Xysticus fraternus
Anyphaena saltabunda
Phrurolithus alarius
Phrurolithus palustris
Dendryphantes capitatus

The above 17 species, or 17.1% of the total number of species, constitute 67.6% of the total number of individuals in the special collections.

SPECIES REPRESENTED BY 50 OR MORE INDIVIDUALS.

Ariadne bicolor
Coloetes hybridus
Pisaurina mira
Dolomedes fontanus
Dictyna foliacea
Linyphia clathrata
Ceratinopsis imterpres
Araneus marmoreus
Misumenops asperatus

The above total of 26 species, or 26.2% of the entire number of species, equals 81.2% of all individuals in the special collections.

SPECIES REPRESENTED BY 25 OR MORE INDIVIDUALS.

Coras medicinalis
Diplocephalus exiguus
Araneus arabesca
Araneus arenatus
Clubiona obesa
Maevia vittata
Habrocestum pulex
Neon nelli

The above 34 species, or slightly more than a third (34.2%) of all species, aggregate 3,664 individuals or 87.2% of the total 4,201 individuals in the eighteen special collections from April 13, 1929, to April 10, 1928, inclusive.

SUMMARY AND CONCLUSIONS.

Ninety-nine species of spiders were present in the forest studied, thirty-four of which constitute 87.2% of the total number of individuals.

Numerically dominant species of spiders present in the Beech-Maple forest are not always typical forest spiders but may be forest edge, transitional or even field forms which migrate into the forest.

There is in the Beech-Maple forest a stratification of spider population which correlates with that of the physical factors and the vegetation.

Of the spiders whose specificity for the association was determined 49 were typical beech-maple 21 transitional and 9 typical field forms.

Hibernation of spiders is preceded by a downward migration of the spider population apparently resulting from the changing physical factors, temperature probably being the most important of them. Physical factors in winter become dominant, biotic negligible.

The majority of the spiders winter over as immature or adult forms, this being true of 65 of the 73 species whose overwintering stage was determined.

A Seasonal succession of societies was shown by the spiders of the forest studied, these being represented by a few principal species two or three of which were easily numerical dominants.

The Spider population of Beech-Maple forest exhibits two high peaks, late spring and early fall. The high peak of autumn is not due to the presence of new species but to the appearance of young of the species which matured in late spring.

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